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Clinical significance of red blood cell distribution width in systemic lupus erythematosus patients

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Abstract

Background: Systemic lupus erythematosus (SLE) is a multi-organ autoimmune disorder with wide variety of clinical presentations. Recently, red blood cell distribution width (RDW) has been used as an inflammatory marker, similar to the erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) where systemic inflammation has been linked to increased RDW. Many researches have assessed independently selective different hematological markers that may reflect disease activity.
Our study aims to examine a number of hematological parameters that could reflect disease activity and to assess if there is a relationship between different hematological parameter (RDW, neutrophils and lymphocytes) to reflect SLE activity using Systemic Lupus Erythematosus Disease Activity Index (SLEDAI).

Results: The study comprised 60 SLE patients (52 females and 8 males) with a mean age of 34.53 years and mean disease duration was 4.085 years. The RDW values were significantly higher ($p < 0.001$) when comparing active patients (16.64 ± 4.7) versus inactive patients (13.16 ± 2.67) and controls (12.7 ± 1.13). Otherwise, insignificant differences were reported when comparing inactive SLE patients versus the control group ($p = 0.242$). There were no significant correlations ($p > 0.05$) between neutrophil count and lymphocyte count with C3, C4, SLEDAI score, 24 h urinary proteins, platelets count but significant only with hemoglobin level ($p = 0.001$).

Conclusion: Increased RDW is connected with active disease status of SLE patients. RDW could be used as a surrogate marker of the inflammation rather than neutrophil and lymphocyte count. It is a simple and easy testing included in CBC thus RDW could be used as a possible indicator to assess disease activity.

Keywords: Autoimmune diseases, RDW, SLE, CBC, Lymphocyte count, Neutrophil count, SLEDAI

Background

Systemic lupus erythematosus (SLE) is a multisystem autoimmune connective tissue disorder with a broad spectrum of clinical presentations. The peak age of onset among young women is between the late teens and early 40s with a female to male ratio of 9:1. Those with African or Asian ancestry are more at higher risk of developing the disease and it may be associated with severe organ affection compared to Caucasian patients. SLE may be a life-threatening condition when major organs are affected but more commonly results in chronic debilitating illness. The cause for SLE has not been identified though environmental factors such as sunlight, hormones, and drugs may precipitate the condition and there is a complex genetic basis [1]. Lupus activity can be measured by many laboratory markers as aberrant production and imbalance of T-helper (Th1/Th2) cell cytokines which have been implicated in the pathogenesis of autoimmunity as IL-18 and IL-10 concentrations are usually significantly elevated in SLE patients and correlated with the SLEDAI score [2].

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Red blood cell distribution width (RDW) is a parameter in complete blood counts that is routinely tested to describe the heterogeneity of red blood cells. During the last years, it has been identified as a valuable index to differentiate between thalassemia, megaloblastic anemia and iron deficiency anemia [3].

The researchers have found that RDW is positively correlated with DAS-28, a widely used disease activity tool for rheumatoid arthritis (RA). Increased RDW in RA patients was reported to be associated with risk of cardiovascular diseases. It has been found that increased rate of RDW, as well as RDW changes in the first year after diagnosis, is correlated with a high risk of cardiovascular accident (heart failure, ischemic heart disease, or cerebrovascular accident), and the significant correlation remained after adjusting for sex and age [4].

Lymphopenia has been reported in most of lupus patients throughout the disease course in a previous adult series [5]. SLE activity is not the only cause of lymphopenia; other factors include infections and medications such as corticosteroids and cytotoxic agents which are frequently included in the treatment of SLE. The pathophysiological mechanisms of lymphopenia are complex, including antibodies against CD8+ T lymphocytes, uncontrolled apoptosis, and increased complement mediated cytolysis of T cells, as well as impaired lymphopoiesis and lymphocyte sequestration [6].

Several reports support the notion that abnormal neutrophil subsets and enhanced neutrophil extracellular trap (NET) formation in SLE may play important roles in promoting innate and adaptive aberrant autoimmunity and tissue damage in SLE [7].

Autoimmune diseases as SLE usually consist of inflammatory components. The chronic inflammation, which begins and is triggered by auto-antigen and maintained by both environmental and genetic risk factors, is a common characteristic for all autoimmune diseases [8]. Therefore, inflammatory parameters, such as CRP and ESR, actually useful to assess and follow up the activity of autoimmune diseases; a novel index for inflammation, RDW, may be also useful to assess the activity of autoimmune diseases. Previous studies have shown that RDW was associated with the increased severity of inflammatory bowel disease (IBD), SLE [9, 10], RA [11], and psoriatic arthritis [12, 13]. Another recent study has also concluded that RDW was increased in patients with SLE [14].

A recent Egyptian study had shown that there was a statistically higher RDW in lupus patients with very high activity than those with high activity [15].

In 2013, Vayá et al. [14] firstly reported that SLE patients have higher RDW than healthy controls. Although some of the SLE patients (26/105) had anemia, the SLE patients without anemia also showed higher RDW than

healthy controls, indicating that increased RDW in SLE patients is not completely attributed to anemia [14]. Subsequent two studies also revealed that RDW is positively correlated with ESR [16, 17]. Besides, these two studies also it was found that RDW is positively correlated with SLEDAI and anti-dsDNA antibody [14, 16]. RDW also correlates with therapeutic outcome in patients with SLE. Compared to patients with normal RDW, patients with higher RDW have lower response to first line therapy, as well as higher rate of flare during one year follow up [17].

Aim of this work
This study is designed to assess the relation between different hematological parameters, RDW, neutrophil, and lymphocyte counts, with disease activity status in SLE patients.

Methods
Design
Cross sectional observational study

Patients
The study included 90 subjects, 60 patients with SLE diagnosed by Systemic Lupus International Collaborating Clinics (SLICC) criteria [18] who were admitted to Rheumatology and Rehabilitation Inpatient Department, University Hospital, from the period 2018 to 2019, and were classified into 2 groups according to SLEDAI score with cutoff point 3 the first group I included 30 SLE patients in an active stage (SLEDAI > 3), and the second group II included 30 SLE patients in an inactive stage (SLEDAI ≤ 3), and thirty healthy volunteers matching for age and sex were also included as a control group (group III). All gave consent to participate in this study [19].

Inclusion criteria
All patients fulfilled the SLICC Classification Criteria for Systemic Lupus Erythematosus.

Exclusion criteria
Any patient with any other autoimmune connective tissue disease other than SLE, also the other causes of a high RDW including anemia either (iron deficiency or b12) or folate deficiency, or chronic liver disease

Patient's assessment
Patients were subjected to full history taking, thorough clinical examination, and laboratory investigations which included complete blood count, (including RDW, total and differential leucocyte count), ESR, serum creatinine, and 24 h urinary protein.

Immunological profile included C3, C4, anti-nuclear antibody (ANA) by IF, and anti-double-stranded DNA antibody (anti-ds-DNA).

The laboratory investigations done for the control group include complete blood count (including RDW, total and differential leucocyte count), ESR, serum creatinine, 24 h urinary protein, C3, C4, and ANA.

Assessment of disease activity using SLEDAI score where no activity (SLEDAI = 0), mild activity (SLEDAI = 1–5), moderate activity (SLEDAI = 6–10), high activity (SLEDAI = 11–19), and very high activity (SLEDAI = 20). The cut off value for SLE Disease activity SLEDAI was considered as ≥ 3 [20].

The study was approved by research ethical committee of the faculty of medicine of our university.

Written consent was taken from all patients and controls and it conforms to the Declaration of Helsinki for human experimentations.

Statistical analysis

A Statistical Package for Social sciences (IBM-SPSS), version 22 IBM, Chicago, USA, was used for statistical data analysis.

Data were expressed as mean, standard deviation, number, and percentage. Mean ± SD was used as a descriptive value for quantitative data.

Student t test was used to compare the means between 2 groups, and Mann-Whitney test was used to compare median of distributed data.

Pearson χ^2 test was used to compare percentages of qualitative data.

Results

The study comprised 60 SLE patients (52 females and 8 males) with a mean age of 34.53 years and mean disease duration was 4.085 years. Regarding the mean age of our study group, there is no significant difference between groups. But the number of females was more than males in 3 groups with significant difference.

There was high significant difference between the active and inactive groups regarding presence of malar rash, photosensitivity, arthritis, and alopecia; most cases in active and inactive groups had photosensitivity by history with no significant difference between active and inactive group.

There was no significant difference between groups regarding presence of discoid lupus erythematosus (DLE) (none of inactive cases had DLE and only 1 inactive SLE case had DLE); only 1inactive SLE case had current oral/nasal ulcer; 56.7% of active and inactive cases had oral/nasal ulcer by history with high significant difference; from the past history 16.7% of active cases and 20% of inactive cases had pleurisy/pericarditis during the disease course with significant difference; and we found that

only 3 active cases had current psychosis/seizures, 5 active cases had psychosis/seizures by history, with highly significant difference (Table 1).

Regarding SLEDAI score, its mean was higher in active group (8.43 ± 4.1) than the inactive group (1.143 ± 0.41) with high significant difference (p value < 0.001) (Tables 2 and 3).

Also, there was non-significant difference among the 3 studied groups regarding serum creatinine and AST, but there was significant difference between the 3 groups regarding each of ALT and ESR. We found that ESR was higher in the active group than other 2 groups. On the other hand, there was significant difference between the 3 groups regarding each of C3 and C4. We found that C3 and C4 were lower in the active cases than in the inactive cases and control group.

Table 1 Clinical data

Characteristics		Active SLE	Inactive	*p* value
Duration of disease		2.72 ± 1.42	5.45 ± 2.26	0.001(HS)
Malar rash	Current	16 (53.3%)	8 (26.7%)	0.001 (HS)
	History	12 (40%)	14 (46.6%)	
	Negative	2 (6.7%)	8 (26.7%)	
DLE	Current	1 (3.3%)	1 (3.3%)	0.21(NS)
	History	2(6.6%)	3 (10%)	
	Negative	27(90.1%)	26 (86.7%)	
Photosensitivity	Current	20 (66.7%)	6 (20%)	0.001 (HS)
	History	10 (33.3%)	19 (63.3%)	
	Negative	0 (0%)	5 (16.7%)	
Oral ulcers	Current	12 (40%)	11 (36.7%)	0.001 (HS)
	History	17 (56.7%)	10 (33.3%)	
	Negative	1 (3.3%)	9 (30%)	
Alopecia	Current	11 (36.7%)	5 (16.7%)	0.001 (HS)
	History	17 (56.7%)	14 (46.6%)	
	Negative	2 (6.6%)	11 (36.7%)	
Serositis	Current	5 (16.7%)	2 (6.7%)	0.005 (S)
	History	8 (26.6%)	6 (20%)	
	Negative	17 (56.7%)	22 (73.3%)	
Neuropsychiatric	Current	3 (10%)	1 (3.3%)	0.005 (S)
	History	5 (16.7%)	2 (6.6%)	
	Negative	22 (73.3%)	27 (90.1%)	
Lupus nephritis	Current	27 (90%)	9 (30%)	0.001 (HS)
	History	3 (10%)	15 (50%)	
	Negative	0 (0%)	6 (20%(	
Arthritis	Current	20 (66.7%)	5 (16.7%)	0.001 (HS)
	History	6 (20%)	19 (63.3%)	
	Negative	4 (13.3%)	6 (20%)	

p value: (S) significant, (NS) non-significant, and (HS) highly significant
DLE discoid lupus erythematosus

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Table 2 Comparison between the studied groups regarding sex and age distribution, laboratory parameters, and disease activity score

Characteristics	Active SLE	Inactive	Control	*p* value
Male	(7) 23.3%	(1) 3.3	(11) 36.7%	Male/female
Female	(23) 76.7%	(29) 96.7	(19) 63.3%	0.006 (S)
Age	34.83 ± 10.49	34.23 ± 9.26	34.53 ± 8.569	0.992 (NS)
CBC				
WBCs	7.02 ± 3.12	7.49 ± 3.29	8.13 ± 3.16	0.402
Hg	11.87 ± 1.8	12.15 ± 1.	12.2 ± 1.9	0.651
PLts	269.6 ± 97	276.3 ± 78	264 ± 66.6	0.843
Lymphocytes	20.9 ± 9.1	27.0 ± 8.3	26.6 ± 12.7	0.04 (S)
Neutrophils	72.1 ± 12	65.6 ± 9.1	65.4 ± 13.9	0.05 (S)
Monocytes	5.06 ± 3.4	5.35 ± 1.7	7.2 ± 12.3	0.48
Basophils	0.33 ± 0.40	0.15 ± 0.26	0.37 ± 0.55	0.09
Eosinophil	1.12 ± 1.15	1.65 ± 1.44	2.48 ± 2.93	0.03 (S)
RDW-CV%	16.64 ± 4.7	13.16 ± 2.67	12.7 ± 1.13	< 0.001 (HS)
24 urine proteins	1207.4	183.62	77.80	< 0.001 (HS)
C3	88.8 ± 40.2	116.7 ± 23.7	163.1 ± 27.01	0.03
C4	15.4 ± 15.4	19.3 ± 12.4	17.7 ± 18.8	0.02
Serum creatinine	0.76 ± 0.30	0.72 ± 0.28	0.80 ± 0.27	0.543
ESR	55.1 ± 29.5	47.0 ± 35.5	31.6 ± 11.8	0.002
ANA	(30) 100.0%	(26) 86.7%	(0) .0%	0.001 (HS)
Anti-ds DNA	73.3%	46.7%	(0) .0%	0.001 (HS)
SLEDAI score	8.43 ± 4.1	1.143 ± 0.41	0 ± 0	< 0.001 (HS)
Renal biopsy	37.9% class II	23.3% class II	0 ± 0	0.004 (S)
	26.7% class V	10% class V		

p value: (S) significant, (NS) non-significant, (HS) highly significant

CBC complete blood count, *WBCs* white blood cell counts, *Hg* hemoglobin, *PLts* platelets, *ESR* erythrocyte sedimentation rate, *ANA* anti-nuclear antibody, *SLEDAI* systemic lupus erythematosus disease activity index, *RDW* red cell distribution width, *C3* complement 3, *C4* complement 4

In urine analysis, we found that the number of active cases had different grades of proteinuria more than the inactive cases with high significant difference. Mean of 24 h urinary proteins was higher in the active cases (1207.4) than in the inactive cases (183.6), and it was 77.8 in control group, with high significant difference (*p* value < 0.001), which showed that the active group has lupus nephritis more than the inactive group.

All active cases were positive for ANA; however, there were 4 cases in the inactive group showed negative ANA, and 100% of control group were negative ANA, with high significant difference (*p* value < 0.001). Most cases in both active and inactive groups had speckled

ANA pattern followed by homogenous pattern with highly significant difference.

We found that 73.3% of active and inactive cases were positive anti-dsDNA; on the other hand, 100% of control group were negative anti-dsDNA with highly significant difference. Also, we found that patients with positive anti-dsDNA had mean RDW higher than patients with negative anti-dsDNA with highly significant difference (*p* < 0.001) (Table 2)

We found that 37.9% of active and 23.3% of inactive cases had class II lupus nephritis (LN); only 10% of inactive cases and 26.7% of active cases had class V LN with significant difference.

Table 3 Comparison between RDW and SLEDAI score with significant RDW % in the active group and SLEDAI score

Variable/ group	Active Mean ± SD	Inactive Mean ± SD	Control Mean ± SD	ANOVA	*p* value
RDW (%)	16.64 ± 4.7	13.16 ± 2.67	12.7 ± 1.13	13.309	**< 0.001 (HS)**
SLEDAI Score	8.43 ± 4.1	1.143 ± 0.41	0 ± 0	104.278	**< 0.001 (HS)**

SD standard deviation, *SLEDAI* systemic lupus erythematosus disease activity index, *RDW* red cell distribution width, *HS* highly significant

Regarding laboratory investigations, there was no significant difference among the 3 studied groups regarding all CBC parameters except mean lymphocytes, mean neutrophils, and mean eosinophil count, as there was lymphopenia, neutrophilia, and eosinopenia in active group compared to other 2 groups with significant difference.

Mean RDW was higher in the active cases (16.64% ± 4.7%) compared to the other 2 groups (13.16% ± 2.67%, 12.7% ± 1.13%, respectively) with highly significant difference (p value < 0.001), and also with highly significant difference between the active and the inactive groups (p value < 0.001 HS) (Table 4). Also, we found that patients with positive anti-dsDNA had mean RDW higher than patients with negative anti-dsDNA with highly significant difference (p < 0.001) (Table 2).

Regarding correlation between RDW and activity indices, Table 5 shows that RDW positively and significantly correlated with both SLEDAI score and 24 h proteins, but it was negatively and non-significantly correlated with each of WBCs count, hemoglobin concentration, platelet count, and C3 and C4 level.

Regarding correlations between neutrophillic count and lymphocytic count and SLE activity indices, there were no correlations between neutrophillic count and lymphocytic count with c3, c4, SLEDAI, 24 h proteins, and platelets but significant only with hemoglobin level (Table 6).

Regarding the ESR, there were a significant correlation with c3, c4, 24 h proteins, and WBCs but not with SLE-DAI, hemoglobin level, and platelets (Table 6).

Discussion

RDW is a parameter routinely assessed to describe the heterogeneity of red blood cells. During the past years, it has been regarded as a useful index to differentiate between thalassemia and megaloblastic anemia, as well as iron deficiency anemia [3].

This study is designed to assess the relation between different hematological parameters, RDW, neutrophil, and lymphocyte counts with disease activity status in SLE patients.

There was significant difference between 3 groups regarding each of C3 and C4. We found that C3 and C4 were lower in active cases than in inactive cases and control group. Our study disagreed with that study that showed no statistically significant difference between the studied groups as regards C3: 85 ± 32.2 mg/l in group I and 76.7 ± 39.4 mg/l in group II. There was a statistically significant difference between the studied groups as regards C4: 11.9 ± 5.4 mg/l in group I and 9.2 ± 3 mg/l in group II [15].

Mean of 24 h proteins in urine were higher in active cases (1207.4) than inactive cases (183.6), and it was 77.8 in control group, with high significant difference, which agreed with the study carried out by Zou et al. [17].

It is widely accepted that C3, C4, and anti-dsDNA antibodies are useful for the estimation disease activity. We found that patients with positive anti-dsDNA had mean RDW higher than patients with negative anti-dsDNA with high significant difference (p < 0.001). However, in study done by Hu et al. [16], there was no correlation observed between RDW and the other indices. This inconsistency may be due to medical intervention, which has a major effect on C3, C4, and anti-dsDNA antibodies [21].

In this study, mean RDW was higher in active cases (16.64% ± 4.7%) compared to other 2 groups (13.16% ± 2.67%, 12.7% ± 1.13%, respectively) with high significant difference (p value < 0.001). Our results agreed with the study carried out by Sabry et al., which showed that there was a statistically highly significant difference between the studied groups as regards RDW: 15.5 ± 2% in group I (high activity SLE) and 18.5 ± 1.2% in group II (very high activity SLE) [15].

Also, Gulkesen and Gozel (2018) [22] found that RDW value was also higher in patients with SLE in comparison with the healthy control group and the elevation in the RDW was statistically significant; this was similar to results of Hu et al. [16] as they found that RDW value was elevated in SLE patients when compared to healthy persons. This finding is also consistent with a recent study carried out by Vayá et al. [14].

Correlation between RDW and disease activity indices revealed that RDW had a positively significant

Table 4 Comparison between the three groups as regard RDW%

Parameters	Group						
	Mean ± SD, median			p value			
	Group I (active)	Group II (inactive)	Group III (control)	p^*	p^{**}	p^{***}	p^{****}
RDW	17.31% ± 2.67%, 17.7%	13.31% ± 1.33%, 13.05%	12.76% ± 0.922%, 12.70%	< 0.001 HS	< 0.001 HS	0.242 NS	< 0.001 HS

*Significance between three groups by ANOVA which is highly significant
**Significance between inactive group versus active group which is highly significant
***Significance between inactive group versus control group which is non-significant
****Significance between active group versus control group which is highly significant
NS non-significant, HS high significant, RDW red cell distribution width

Table 5 Correlation between RDW and activity indices indicating positive correlation with 24 h urine proteins and SLEDAI score

		24 h proteins	ESR	C3	C4	SLEDAI Score	WBCs	Hg	PLTs
RDW	**Pearson Correlation**	0.513	0.297	0.186	0.116-	0.670	0.035	0.132	0.05
	p value	0.000	0.005	0.080	0.277	0.000	0.741	0.215	0.616

CBC complete blood count, *WBCs* white blood cell counts, *Hg* hemoglobin, *PLts* platelets, *ESR* erythrocyte sedimentation rate, *SLEDAI* systemic lupus erythematosus disease activity index, *RDW* red cell distribution width, *C3* complement 3, *C4* complement 4

correlation with both SLEDAI score and 24 h proteins, and this agrees with Sabry et al., who found that there were a highly significant correlation between the SLEDI score and RDW [15]. And there was no significant correlation with each of WBCs, HGB, platelets (PLTs), and negatively correlated with C3 and C4 which may be explained by low titer of these parameters during activity. Also our results agreed to some results of a study which showed that there was a significant negative correlation between the SLEDAI score and Hgb, PLT, C4, and C3 [17].

In our study, there was a positive correlation between RDW and ESR, which agreed with previous studies that have shown that RDW is positively correlated with inflammatory indexes such as CRP and ESR [23] and that RDW also is associated with increased disease activity of inflammatory bowel disease [8, 9] and RA [10]. Also another study showed that the results of analysis showed that RDW was positively correlated with CRP, ESR, and SLEDAI-2-K score [14]. These results suggested that RDW might be a potential index to evaluate disease activity of SLE.

Our study showed that there was non-significant correlation between RDW and HGB which disagree with Vayá et al. [14] who concluded that in SLE patients, RDW is strongly associated with hemoglobin levels ($r = -0.639$, $p < 0.001$), but not in non-anemic ($r = -0.076$, $p > 0.05$).

Our study showed that there were no correlations between the mean neutrophillic count and the mean lymphocytic count with C3, C4, SLEDAI, 24 h proteins, and platelets but significant only with hemoglobin level which disagree with the results of other study that

concluded that lymphopenia and leucopenia is a common finding in SLE patients and was significantly associated with lupus nephritis, complement consumption, higher steroid doses, and cyclophosphamide administration [5]. Also, a previous study revealed a significant association of lymphopenia and nephritis and the association of lymphopenia with consumed C3 [24], while on the other hand, a study agreed with our results and showed no link between lymphopenia and nephritis and C3 consumption [25].

In contrast to previous studies [26, 27], there were no correlations between the SLEDAI and lymphopenia, which also agreed with that reported in another previous study, where lymphopenia had no statistical significance with SLEDAI [24].

Hu et al. [16] also suggested that RDW is a potential index to estimate the disease activity of SLE. Compared with traditional disease activity assessment tools, the following advantages of RDW are worth noting: (I) RDW is an easy and cheap required inflammatory parameter, (II) the long life span of red blood cell which is approximately 130 days [12], and (III) RDW may not be affected by recent infections. This last advantage makes RDW particularly useful to evaluate the disease activity of SLE patients with infections.

Conclusion
RDW positively correlates with SLEDAI score and 24 h urinary proteins, so it reflects disease activity as well as renal affection but the lymphocytic and leukocytes count had no significant correlation with these activity indices. Therefore, RDW could be used as a surrogate marker of

Table 6 Correlation between laboratory parameters and SLEDAI score with ESR, neutrophils and, lymphocytes counts

		C3	C4	SLEDAI	24 h protein	WBCs	Hg	PLTs
ESR	Pearson	0.306	0.464	0.189	0.345	− 0.232	− 0.257	0.092
	p value	**0.003**	**0.001**	0.152	**0.001**	0.025	0.15	0.389
Neutrophils	Pearson	0.216	0.079	0.182	0.062	0.095	− 0.363	0.012
	p value	0.144	0.597	0.164	0.564	0.375	**0.001**	0.913
Lymphocytes	Pearson	− 0.183	− 0.08	− 0.240	− 0.085	− 0.093	0.416	0.002
	p value	0.217	0.591	0.064	0.427	0.384	**0.001**	0.989

Pearson's *t* test was used
CBC complete blood count, *WBCs* white blood cell counts, *Hg* hemoglobin, *PLts* platelets, *ESR* erythrocyte sedimentation rate, *SLEDAI* systemic lupus erythematosus disease activity index, *RDW* red cell distribution width, *C3* complement 3, *C4* complement 4

the inflammation rather than neutrophil and lymphocyte count. It is a simple and easy testing included in CBC thus RDW can be used as a possible indicator to assess disease activity. It can reflect the ongoing inflammatory state in this autoimmune disease and needs to be studied in various aspects of this complex autoimmune disorder in relation to different organ affection in a large group of patients.

Abbreviations
SLE: Systemic lupus erythematosus; RDW: Red blood cell distribution width; RA: Rheumatoid arthritis; NET: Enhanced neutrophil extracellular trap; SLEDAI: Systemic Lupus Erythematosus Disease Activity Index; ANA: Anti-nuclear antibody; dsDNA: Double-stranded DNA; SLICC: Systemic Lupus International Collaborating Clinics; LN: Lupus nephritis; DL: Discoid lupus; CBC: Complete blood picture; Hg: Hemoglobin; PLTs: Platelets; WBCs: White blood cells; ESR: Erythrocyte sedimentation rate; CRP: C-reactive protein

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